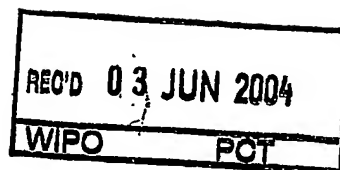


## PATENT COOPERATION TREATY

## PCT



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>325.0207PCT</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/US03/28187</b>	International filing date (day/month/year) <b>09 September 2003 (09.09.2003)</b>	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC <b>IPC(7): B01D 53/14 and US Cl.: 95/164,176,204,235,236; 96/234</b>		
Applicant <b>FLUOR CORPORATION</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>3</u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand <b>04 March 2004 (04.03.2004)</b>	Date of completion of this report <b>14 April 2004 (14.04.2004)</b>	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer  Duane S. Smith Telephone No. 571-272-0987	

Form PCT/IPEA/409 (cover sheet)(July 1998)

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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/28187

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed.
- ☒ the description:  
 pages 1-12 as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
 pages NONE, as originally filed  
 pages NONE, as amended (together with any statement) under Article 19  
 pages 13-15, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the drawings:  
 pages 1, as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
 pages NONE, as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/US03/28187**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)

Claims 1-20 YESClaims NONE NO

Inventive Step (IS)

Claims 1-20 YESClaims NONE NO

Industrial Applicability (IA)

Claims 1-20 YESClaims NONE NO**2. CITATIONS AND EXPLANATIONS**

Claims 1-20 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the claimed features of a gas treatment plant including an absorber in which acid gas is removed from a feed gas using a physical solvent to thereby produce a rich solvent, wherein the rich solvent is contacted with a recycle gas at a location downstream of an equilibrium stage where the feed gas enters the absorber and wherein the recycle gas is produced from the rich solvent nor a gas treatment plant nor a gas treatment plant including a flash vessel that produces an atmospheric flash gas comprising a first acid gas and a flashed rich solvent having a second acid gas; a vacuum stripper fluidly coupled to the flash vessel and producing lean solvent from the flashed rich solvent; and wherein the atmospheric flash gas and a sweet gas are fed into the vacuum stripper at a position such that the first acid gas strips the second acid gas from the flashed rich solvent and the sweet gas strips the first acid gas from the rich solvent.

Claims 1-20 meet the criteria set out in PCT Article 33(4), and thus the gas treatment plant has industrial applicability because the subject matter claimed can be made or used in industry.

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## CLAIMS

What is claimed is:

1. A gas treatment plant comprising an absorber in which acid gas is removed from a feed gas using a physical solvent to thereby produce a rich solvent, wherein the rich solvent is contacted with a recycle gas at a location downstream of an equilibrium stage where the feed gas enters the absorber, and wherein the recycle gas is produced from the rich solvent.
2. The gas treatment plant of claim 1 wherein the feed gas comprises natural gas at a pressure of at least 2000 psig, and wherein the acid gas is at least one of hydrogen sulfide and carbon dioxide.
3. The gas treatment plant of claim 1 wherein the recycle gas is produced from flashed gases of a plurality of serially coupled flash vessels, and wherein the recycle gas is compressed to absorber pressure.
4. The gas treatment plant of claim 1 wherein the rich solvent is flashed in a flash vessel to produce an atmospheric flashed rich solvent that is fed into a vacuum stripper to produce lean solvent.
5. The gas treatment plant of claim 4 wherein the vacuum stripper separately receives as a stripping gas a sweet gas produced by the absorber and atmospheric flash gas from the flash vessel.
6. The gas treatment plant of claim 1 wherein the rich solvent is contacted with the recycle gas in the bottom portion of the absorber.
7. The gas treatment plant of claim 1 wherein the rich solvent is contacted with the recycle gas in a static mixer outside the absorber.
8. A gas treatment plant comprising a contact vessel in which a rich solvent that is formed in an absorber contacts a recycle gas, wherein the recycle gas is produced from the rich solvent, and wherein the absorber receives a feed gas from which an acid gas is removed using a physical solvent, thereby producing the rich solvent.

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9. The gas treatment plant of claim 8 wherein the feed gas comprises natural gas at a pressure of at least 2000 psig, and wherein the acid gas is at least one of hydrogen sulfide and carbon dioxide.
10. The gas treatment plant of claim 8 wherein the contact vessel comprises a static mixer, and wherein the contact vessel is fluidly coupled to a flash vessel.
11. The gas treatment plant of claim 8 wherein the rich solvent is flashed downstream of the contact vessel in a plurality of sequentially coupled flash vessels, wherein each of the flash vessels produces a portion of the recycle gas.
12. The gas treatment plant of claim 11 wherein at least one of the flash vessels produces a flashed rich solvent that is fed into a regenerator to produce a lean solvent for the absorber, and wherein the at least one of the flash vessel further produces an atmospheric flash gas.
13. The gas treatment plant of claim 12, wherein the absorber produces a sweet gas, wherein the regenerator is a vacuum stripper, and wherein at least a portion of the sweet gas and at least a portion of the atmospheric flash gas are separately fed into the regenerator as a stripping gas.
14. The gas treatment plant of claim 13 wherein the regenerator is configured such that carbon dioxide in the atmospheric flash gas strips hydrogen sulfide from the flashed rich solvent, and that the at least portion of the sweet gas strips the carbon dioxide from the flashed rich solvent.
15. A gas treatment plant comprising:
  - a flash vessel that produces an atmospheric flash gas comprising a first acid gas and a flashed rich solvent comprising a second acid gas;
  - a vacuum stripper fluidly coupled to the flash vessel and producing a lean solvent from the flashed rich solvent; and
  - wherein the atmospheric flash gas and a sweet gas are fed into the vacuum stripper at a position such that (a) the first acid gas strips the second acid gas from the

flashed rich solvent and (b) the sweet gas strips the first acid gas from the rich solvent.

16. The gas treatment plant of claim 15 wherein the first acid gas is carbon dioxide, and wherein the second acid gas is hydrogen sulfide.
17. The gas treatment plant of claim 15 wherein the flash vessel receives a rich solvent from an absorber, wherein the rich solvent is contacted with a recycling gas before the rich solvent enters the flash vessel.
18. The gas treatment plant of claim 17 wherein the recycling gas is produced in another flash vessel that is upstream fluidly coupled of flash vessel and downstream fluidly coupled to the absorber.
19. The gas treatment plant of claim 17, further comprising a contact vessel in which the rich solvent contacts the recycling gas.
20. The gas treatment plant of claim 17 wherein the absorber receives a feed gas at a pressure of at least 2000 psig, and wherein the feed gas comprises a natural gas.